

**WHAT IS CLAIMED IS**

:

1. A method of determining aberration of a projection system of a lithographic apparatus comprising:
  - projecting a reference test pattern in the lithographic apparatus;
  - projecting a second test pattern in the lithographic apparatus;
  - measuring relative displacements between items in resulting images of said reference test pattern and said second test pattern; and
  - determining information on the aberration of the projection system, using said measurements,
  - wherein projecting the second test pattern comprises filtering to select particular radiation paths through the projection system; and
  - wherein the measuring is performed for a plurality of images of the second test pattern obtained at planes displaced along an optical axis relative to each other.
2. A method according to claim 1, further comprising calculating, for the plurality of images, a rate of change of displacement of portions of the second test pattern with respect to displacement along the optical axis.
3. A method according to claim 2, further comprising calculating a location in a pupil of the projection system traversed by the radiation for particular portions of the second test pattern using the calculated rate of change.
4. A method according to claim 1, wherein coordinates of a filter used for the filtering are included as variable parameters in the calculations for determining the aberration information.
5. A method according to claim 1, wherein spherical aberration introduced by a filter used for the filtering is included as a variable parameter in determining the aberration information.

6. A method of determining aberration of a projection system of a lithographic apparatus comprising:
- projecting a reference test pattern in the lithographic apparatus;
  - projecting a second test pattern in the lithographic apparatus;
  - measuring relative displacements between items in resulting images of said reference test pattern and said second test pattern; and
  - determining information on the aberration of the projection system, using said measurements,
- wherein projecting the second test pattern comprises filtering to select particular radiation paths through the projection system; and
- wherein coordinates of the filter are included as variable parameters in calculations for said determining.
7. A method of determining aberration of a projection system of a lithographic apparatus comprising:
- projecting a reference test pattern in the lithographic apparatus;
  - projecting a second test pattern in the lithographic apparatus;
  - measuring relative displacements between items in resulting images of said reference test pattern and said second test pattern; and
  - determining information on the aberration of the projection system, using said measurements,
- wherein projecting the second test pattern comprises filtering to select particular radiation paths through the projection system; and
- wherein spherical aberration introduced by a filter used for the filtering is included as a variable parameter in determining the aberration information.
8. A method according to claim 7, wherein the spherical aberration is used to correct the measured displacements between portions of the resulting images of said reference test pattern and said second test pattern.

9. A device manufacturing method comprising:  
projecting a patterned beam of radiation onto a target portion of a substrate, and  
correcting for said aberration to reduce the aberration of the patterned beam projected  
onto the target portion of the substrate.
10. A semiconductor device manufactured according to the method of claim 9.